

Draft
National Park Service, Northeast Region
Coastal and Barrier Network Steering Committee
Shoreline Change Workgroup
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Assessment of Alternatives for Coastal and Estuarine Shoreline Change Monitoring

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The above group of people met on January 9, 2001, to discuss shoreline change monitoring. Below are listed some questions that we were to consider.

I. WHAT DO MANAGERS THINK IS IMPORTANT?

Shoreline change is a primary concern for the Coastal and Barrier Network of the NPS Vital Signs Project. The goal of the vital signs monitoring program is to provide scientifically sound information for managing park resources and informing the public, it should also allow managers to confront and mitigate threats to the park, as well as operate more effectively in legal and political arenas. Managers are looking for meaningful predictions of long-term trends of coastal change. Each park has particular information needs to address site-specific resource issues. However, a programmatic approach that is coordinated at the Regional level can successfully address the individual and common concerns of the Coastal and Barrier Network.

I called managers from each of the eight parks in the network to inquire of their concerns with regards to shoreline change. Credible rates of coastal/marsh change would enable the managers to determine expenditure priorities for resource preservation and protection. Piping plover habitat identification and prediction of change are critical for managing this T&E species and other T&E or Species of Concern. Long-term monitoring of coastal change will assist in the development of predictive models habitat and vegetation change. Meaningful rates of change and locations of active hotspots are important for planning the preservation of cultural resources and siting new facilities. The reduction of salt marsh and salt marsh islands related to sea level rise (THST) and perturbations of the sediment supply dynamics (Jamaica Bay-GATE) is a concern for parks with estuarine or bay ecosystem. The Reformulation Plan underway for the south shore of Long Island points to the necessary interagency collaboration in which NPS personnel must play an active role. Strong fiscal and personnel constraints for implementing long-term monitoring programs were voiced by a majority of the park managers. Please refer to earlier documents associated with the Network April 2000 meeting for more information.

II. CATALOG AND EVALUATE EACH PARK'S SHORELINE CHANGE PROGRAM IF ONE EXISTS. CATALOG AND EVALUATE PARK NEEDS AND DETAIL METHODOLOGIES TO ADDRESS THESE NEEDS, INCLUDING COSTS, EXPERTISE, STAFFING AND POTENTIAL COOPERATORS.

For example: Columbia University using Lidar in Jamaica Bay (GATE), Jim Allen working at Sandy Hook and developing CACO protocol, ASIS using Lidar, VIMS work at COLO. Workgroup should create a template to fill in data.

(THIS NEEDS TO BE FILLED IN Jim is the best resource of Info.)

III. CONSIDER VARIOUS PROTOCOLS: LIDAR, GPS, VIDEOGRAPHY AND AERIAL PHOTO ANALYSIS. DO A COST AND METHODS COMPARISON. JUSTIFY THE NEED TO INSTITUTIONALIZE SUCH A MONITORING PROGRAM.

Please, refer to *Vital Signs of Northeastern Coastal Park Resource Change: Shoreline Monitoring Group Report* (Jim Allen. 2000) (Attached as an Addendum). This document is the shoreline change contribution to the National Park Service Inventory and Monitoring Program: A Summary of the Coastal and Barrier Network Monitoring Workshop, April 13th and 14th, 2000.

IV. IDENTIFY OTHER SHORELINE CHANGE MONITORING PROGRAMS THAT MAY BE ABLE TO COST-SHARE WITH THE NETWORK PROGRAM. ECONOMIES OF SCALE. WHO CAN COST SHARE? DRAFT A NETWORK PLAN INCLUDING BUDGET.

The Workgroup that was assembled at the USGS, Woods Hole Field Center recommended that the NPS Vital Signs shoreline monitoring component begin this season. The shoreline monitoring component will involve the USGS staff who are researching the methods of monitoring shoreline change and developing protocols to produce products that can be transmitted to NPS staff and management. John Brock, USGS St. Petersburg Field Center, has a cooperative working relationship with Assateague National Seashore. Brock is developing algorithms that will decode LIDAR data into measureable features. Brock is currently working with data from ASIS and CACO. His emphasis is to develop the algorithms in order to measure features in the National Seashores. An important outcome of his efforts has been the development of an algorithm to determine mean high water elevation from LIDAR data. Jeff List has demonstrated the value of his SWASH program for identifying short-term trends of shoreline dynamics.

An Operational Monitoring Strategy

1. Hire a GS 12 GIS Specialist/Data Manager to support NER park units with Coastal Change Monitoring. A NPS-based employee could lead the monitoring efforts required in the coastal parks, with adequate skills and training for data acquisition and analytical processing. Such a staff member could be stationed regionally, with a requirement to support all coastal parks when and where needed. A university-based appointment for this person would most efficiently use new advances in technology and methodology, provide access to highly skilled analytical interpretation, and may be in the best interest of the Northeast Region of the NPS. Individual park staff would be needed

still to supplement the field survey requirements at the local level. This person would train the local park staff in field techniques and GIS analyses. The person should be familiar with complex data and be able to perform appropriate analyses or work with cooperators to generate the analyses. This person may be the Data Manager that the Data Management Workgroup recommended

Costs: \$65K

2. Lidar surveys would be flown every two years for ASIS, CACO, FIIS, and GATE. Such surveys were flown in 2000. The next flight would occur in Fall 2002. NASA collects the data and performs preprocessing data management. Then John Brock's would apply the Lasermapping system that the data can be imported in ArcInfo. The analyst listed in #1 would then manage and analyze the ArcInfo data for park purposes.

Costs: \$50K per Lidar Flight

3. Shoreline Change Vital Signs that can be determined from Lidar surveys are MHW-contour, Bluff toe/top, vegetation boundary, subaerial beach volume changes, and dune crest height. Each requires ground truthing via traditional surveying and new GPS technology. The ground truthing efforts would be coordinated by the Data Manager. The only lidar-derived vital sign that is currently operational is the MHW-contour. John Brock's group has developed an algorithm, which uses the ArcInfo data, to delineate any contour. His group will need support to develop algorithms for the other vital signs. Once these other algorithms become operationally sound then the algorithms could be passed onto the Regional GIS Specialist/Data Manager.

The shoreline position would be determined by the Regional Data Manager or the in-park staff via ArcInfo. Jeff List, USGS-Woods Hole, has knowledgeable staff that would be able to generate the shoreline position. Jim Allen, working with Chuck LaBash's URI group, may also be able to generate the shoreline position. Also, Lidar surveys of the National Seashores have already been flown. Using these current data sets, shoreline position can be extracted and change between surveys can be determined.

Costs: \$40K for John Brock's personnel to develop algorithms.

\$40K for Shoreline extraction via Woods Hole or URI

4. The SWASH program, under Jeff List's direction, would rotate through the parks. SWASH surveys are designed to quantify the fair weather shoreline position as it pertains to determining long-term trends from the lidar shoreline data. This is an essential component of credible predictions of rates of coastal change.

Costs: USGS cost share

5. Spatial patterns of coastal change have very variable signatures. GPS (mapping grade) surveys of the shoreline 2 times per year would provide data of the hotspots and general trends of coastal change. The Regional GIS Specialist would coordinate these surveys that would be performed by local park staff. The parks should pool resources for the equipment for this type of monitoring. The parks as a whole already have mapping grade GPS equipment.

Costs: \$5K for travel and lodging for initial training of local staff

6. Historical shoreline position data already exists in digital form for the areas of concern, i.e., CACO, the Sandy Hook of GATE. Mark Duffy is securing digital data for ASIS however there may be some data gaps for the Virginia portion of the park. This data has only the (x, y) coordinates. The Elevation coordinate, z, must be assigned to this data in order to examine shoreline change trends at decadal and century time scale. This would be an annual expense for the first 2 years of the program.

Costs: \$40K, Jim Allen and Chuck LaBash's group at URI